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Review of the Clinocerinae of Southern Africa (Diptera: Empididae)

by

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ABSTRACT

The Clinocerinae of Southern Africa are reviewed and include six genera and 14 species. A primitive genus, *Afroclinocera* gen. n. and two new species (*obesa* and *pecki*) are described and the new genus is considered the sister genus of the South American and Australian genus *Proagomyia* Collin. The first Southern African record of *Roederiodes* Coquillett (*R. bifidus* sp. n.) is reported. Two new species of *Clinocera* (*smithi* and *adesa*) together with *C. tripunctata* Smith are the only species of this genus in Africa and represent a previously unrecognised species-group. The male of *Dolichocephala duodecempunctata* Smith is described, and additional records of other clinocerine species are provided. Keys to genera and species and illustrations of male terminalia are included. The phylogenetic relationships of all Southern African genera and/or species of Clinocerinae are discussed.

INTRODUCTION

Adults of Clinocerinae (Diptera: Empididae) are associated with streams, rivers and boggy areas, and in Southern Africa are recorded from lowlands to nearly 3000 m in altitude. They are generally small to medium sized, usually greyish or brownish flies, with long slender legs and narrow wings (anal angle not developed). Some species appear to be primarily cold stenotherms, while others are tolerant of a range of temperatures. A total of 24 species of Clinocerinae presently are recorded from the Afrotropical Region, including nine species and four genera from Southern Africa prior to this study. This group was last revised by Smith (1969).

The majority of Southern Africa clinocerine species appear to be most closely related to East African species. In fact, several widespread species also are found in the highlands further north (see *Dolichocephala* Macquart and *Kowarzia* Mik below). Two clinocerine taxa are apparently endemic to Southern Africa and include the *Clinocera tripunctata* group and an undescribed new genus. Further details are discussed under these taxa.

In this paper, new species of Clinocerinae are described from Southern Africa, including a new genus.

MATERIALS AND METHODS

This study was based on the examination of approximately 100 adult specimens borrowed from or deposited in the following institutions: The Natural History Museum, London, U.K. (BMNH); Canadian National Collection of Insects, Ottawa, Canada (CNC); Natal Museum, Pietermaritzburg, South Africa (NMSA); Zoologisches Forschungsinstitut und Museum Alexander Koenig, Bonn, Germany (ZFMK).

Terms used for adult structures primarily follow those of McAlpine (1981), and for the male terminalia those of Sinclair (1994) and Cumming *et al.* (1995). To facilitate observation, terminalia were macerated in hot 85 % lactic acid and immersed in glycerine. Label data of holotypes are cited in full, with original spelling, punctuation and date; lines are delimited by a slash mark (/), and a semicolon separates data quoted from different labels. The following abbreviations are used in the descriptions: dc – dorsocentral bristles; npl – notopleural bristles; pprn – postpronotal bristles; presut spal – presutural supra-alar bristles; psut spal – postsutural supra-alar bristles; pal – postalar bristles; sctl – scutellar bristles; S – sternite; T – tergite.

TAXONOMY

Key to Southern African genera of Clinocerinae

1 Acrostichals long, one-quarter length of dorsocentral bristles; legs with long bristles and setae, 1–2 X width of leg segment; labrum long, equal to height of head, base swollen (Fig. 1); hind femur of male inflated (Fig. 6) .... **Afroclinocera** gen. n.

– Acrostichals very reduced or absent; legs lacking bristles and few setae; labrum usually short, about one-quarter height of head, base not swollen; hind femur of male not inflated 2

2 Proboscis (including labrum) as long as head; labrum slender; labellum narrow, not sucker-like .... **Roederiodes** Coquillett

– Proboscis less than half height of head; labrum subtriangular; labellum sucker-like 3

3 Neck arising high on occiput, head extending obliquely forward .... **Dolichocephala** Macquart

– Neck near centre of occiput; head hypognathous 4

4 Lower margin of face lacking notch or deep cleft; phallus lacking apical filament (Figs 9–11) .... **Clinocera** Meigen

– Lower margin of face with notch or deep cleft; phallus with articulated, apical filament (Figs 16, 18) 5

5 Face with setulae along inner margin of eye .... **Kowarzia** Mik

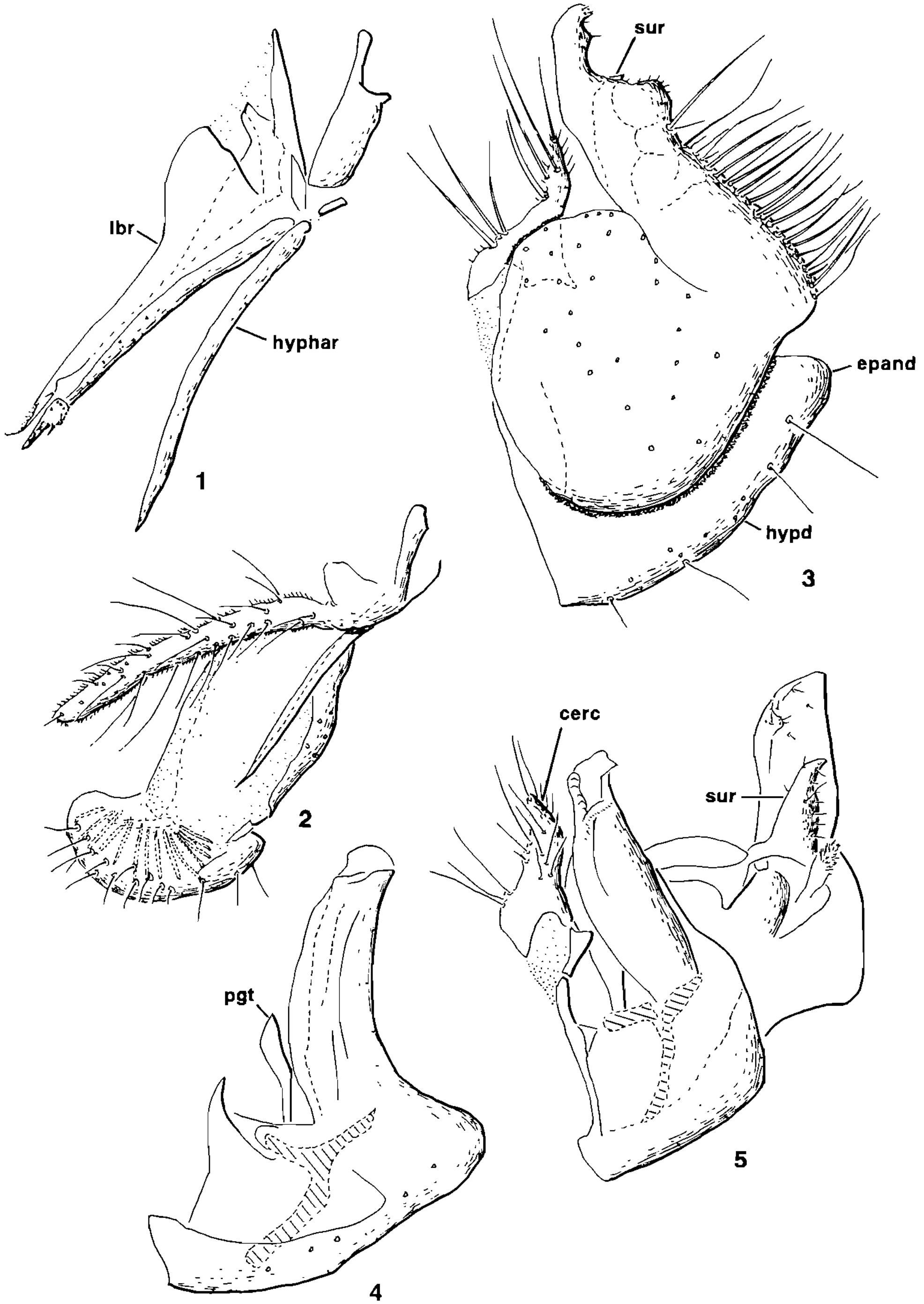
– Face lacking setulae along inner margin of eye .... **Wiedemannia** Zetterstedt

Afroclinocera gen. n.

Etymology: Named in reference to its restriction to the African continent. Gender feminine.

Type-species: *Afroclinocera obesa* sp. n.

Recognition: Distinguished from related genera by a complete Sc, long arista, pubescent eyes, long leg bristles, and inflated male hind femur.



Figs 1–5. Mouthparts and male terminalia of *Afroclinocera*, lateral view. 1. *A. pecki* sp. n., labrum, hypopharynx. 2. *A. pecki*, maxilla, labium. 3. *A. obesa* sp. n., male terminalia. 4. *A. obesa* sp. n., hypandrium, phallus, 5, *A. pecki*, left epandrial lobe removed. [Abbreviations: cerc = cercus; epand = epandrium; hypd = hypandrium; hyphar = hypopharynx; lbr = labrum; pgt = postgonite; sur = surstylus.]

Description:

Male:

Head: Eyes with dense ommatrichia, widely dichoptic; frons V- shaped, face parallel-sided, bare. Antenna with scape and pedicel short, subequal in length, bearing setae; first flagellomere onion-shaped to cone-shaped, bearing long slender arista, apex of arista bearing long setula. Proboscis (Fig. 1) long and stout; palpi very long and slender, extending beyond labellum and bearing long setae. Labrum with greatly swollen base; apex with membranous flap, flanked by pair of epipharyngeal blades; blades bearing stout setae beneath. Hypopharynx longer than labrum, with slight subapical dip. Lacinia free, long and slender, with pointed tip. Labellum (Fig. 2) held horizontal to prementum, bearing approximately 15 well-developed pseudotracheae.

Thorax: Strongly arched; pruinescence of pleura and coxae reduced to pale dusting; vittae of scutum absent. Acrostichals long, uniserial, ending opposite suture; 5 pairs dc with setulae intermixed; 1 pprn; 1 presut spal; 2–3 npl; 2 psut spal; 1 pal; 1 pair sctl with outer marginal setulae. Laterotergite bare; antepronotum with pair of long setae; prosternum fused laterally to proepisternum; mesanepimeron forming complete pocket.

Wing: Broad, infuscate, with partially developed anal angle; 1 basal costal seta; stigma not apparent. All veins lacking macrosetae; stout costal setae reduced to fine, inconspicuous setulae positioned dorsally; proximal to R_1, costa with double row of long setae, more than twice length of distal costal setae; Sc complete; R_{4+5} branched; cell dm slightly produced apically; base of M_1 and M_2 widely separated; width of cell cup slightly narrower than cell bm; A_1 faint, straight. Halter knob dark, base of shaft pale.

Legs: Clothed in long, dark setae. Fore coxa with 3 long anterolateral setae, longer than half length of coxa. Fore femur lacking pre-apical anterior comb; basal two-thirds with posterodorsal row of stout setae. Fore tibia with anterior apical comb, lacking biserial row of setae beneath; apex with ventral and anterodorsal, pre-apical bristles. Hind coxa and femur inflated, bearing stout setae beneath. Hind tibia with finger-like projection on basal third; posterior apical comb present; inner margin clothed in long, erect, slender setae. Fore tarsomere 2 much longer than tarsomeres 3 or 4; tarsomere 5 with long, dorso-apical extension; empodium with long pubescence beneath; claws nearly one-half length of tarsomere 5.

Abdomen: Tergites 1–7 well sclerotised, lacking modified setae or tubercles; long, stout setae on lateral margins of tergites; terminalia arched dorsally over tergites 6–8; T8 slender, expanded laterally.

Terminalia: Hypandrium rounded posteriorly, prolonged dorsally and fused laterally with erect phallus; postgonites short, erect, anterior to phallus (Fig. 4); gonocoxal apodemes absent. Phallus arising subapically, forming complex with hypandrium; ejaculatory apodeme slender, articulated with base of phallus. Epandrium expanded over hypandrium, bearing broad, thumb-like projection; outer margin of lobe with fringe of long setae (Fig. 5). Cercus short with apex pointed, not subdivided. Surstylus arising from inner margin of epandrial lobe, sickle-shaped, shorter than epandrial lobe.

Female: Similar to males, except: hind leg unmodified; abdominal sclerites telescoping. Terminalia (Fig. 8): segment 8 retracted within preceding segment, sclerites shiny, lacking pubescence; T8 with several short setae confined to posterior margin; S8 with setae confined to posterior margin; setose posterodorsal lobe present; genital fork sclerotised and pigmented; T10 clothed in short setae, posterior margin evenly rounded; S10 U-shaped; cercus short, cylindrical; large, darkly sclerotised, spherical spermathecal receptacle at end of long duct.

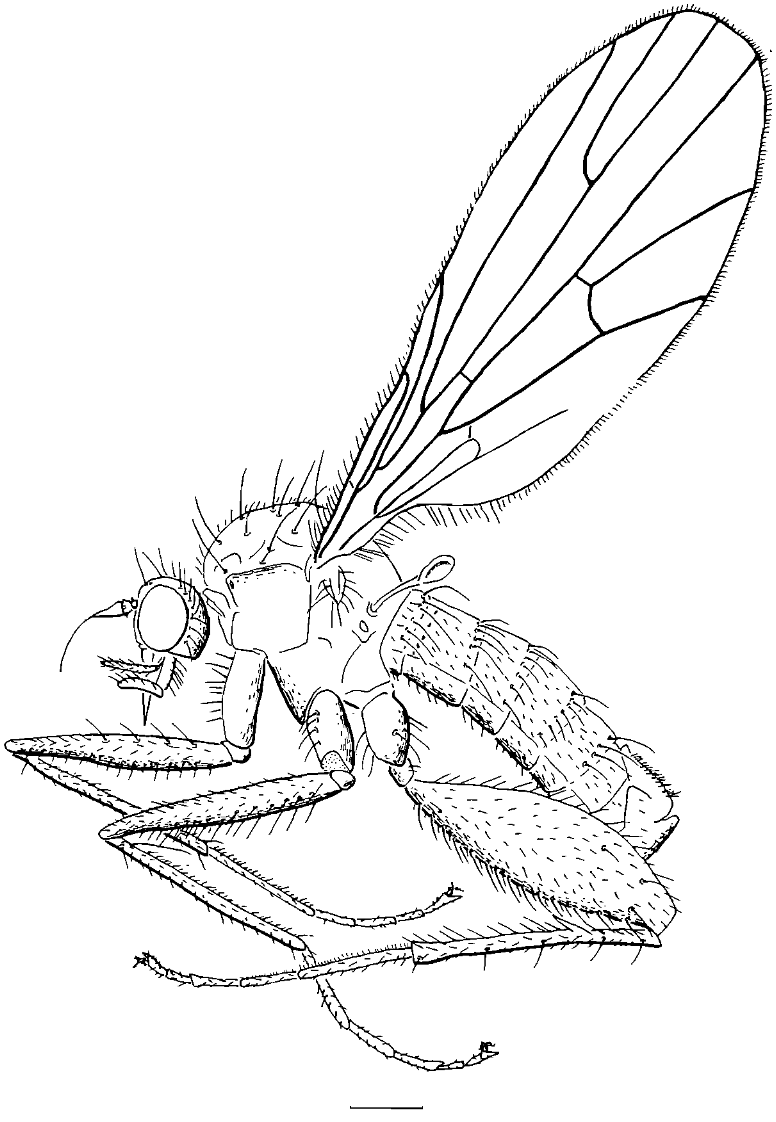


Fig. 6. *A. obesa* sp. n., male habitus (scale bar = 0.5 mm).

Distribution: Known only from KwaZulu-Natal, South Africa.

Biology: The flying behaviour of this genus is unusual for the Clinocerinae. Adults were observed to skate or glide in calm pools in cascading streams, with all six legs in contact with the water surface. The wings are used to propel them quickly about. This behaviour is known in several other empidoids including *Hydropeza* Sinclair from Australia and New Zealand and *Ephydrempis* Saigusa (Saigusa, pers. comm.). Given the close proximity to the water surface, specimens were most effectively captured by using a dip net.

Phylogenetic relationships: This new genus differs greatly from the northern hemisphere concept of Clinocerinae, but appears to be correctly assigned based on the pubescent eyes, pulvilliform empodium, erect costal setae (although reduced to fine setulae), very long processes at apex of fifth tarsomere (very common in the subfamily), and its aquatic habits (see Sinclair 1995). It is hypothesised that *Afroclinocera* is the sister genus to *Proagomyia* Collin based on the following: base of labrum swollen; costal setae positioned dorsally; enlarged surstylus; general configuration of the male terminalia. The new genus strongly differs from *Proagomyia* by the distinct sexual dimorphism, where the male hind femora are inflated and strongly spinose, and the appearance of a finger-like process on about the middle of the hind tibia. Table 1 lists and compares the major differences between these two genera. Although sister genera, recognition of a new genus is considered justified not only on the distinctive differences, but as many of these features have also been used to separate other empidoid genera.

TABLE 1
Comparison of the clinocerine genera *Afroclinocera* and *Proagomyia*.

Afroclinocera	*Proagomyia*
Sc complete	Sc incomplete
stigma not apparent	stigma present
eye with dense ommatrichia	eye bare or sparse ommatrichia
first flagellomere less than half length of arista	first flagellomere long, usually subequal or longer than arista
labrum with 1 pair epipharyngeal blades	labrum with 2 pairs epipharyngeal blades
lacinia pointed	lacinia blunt
leg bristles present	leg bristles absent
spermatheca large, spherical	spermatheca small, bulbous
gliding on surface of pools	confined to wet rocks, no surface gliding

Afroclinocera represents a new southern hemisphere genus and together with *Asymphyloptera* Collin and *Proagomyia* (and an undescribed genus) are confined almost entirely to this region. These genera represent the most plesiomorphic taxa of the Clinocerinae according to the cladogram of Sinclair (1995). Some northern hemisphere genera are known south of the equator, but probably represent more recent dispersals southwards. Only *Asymphyloptera*, among these primitive genera, is recorded north of the equator (Venezuela, Costa Rica, Arizona) (Sinclair 1995), and may represent dispersal northwards or possibly a much more widespread ancestral population existed than was previously assumed.

Key to species of *Afroclinocera*

1 First flagellomere conical; arista about twice length of first flagellomere; pleura with extensive pale areas including posterodorsal corner of katepisternum and laterotergite; apex of epandrial lobe narrow, hooked with sculptured posterior margin (Fig. 3) .... **obesa** sp. n.

- First flagellomere onion-shaped; arista about three times length of first flagellomere; pleura dark with limited pale areas including anterior margin of the anepimeron; apex of epandrial lobe evenly rounded (Fig. 5) .... **pecki** sp. n.

Afroclinocera obesa sp. n.

Figs 3, 4, 6, 8

Etymology: Name refers to the enormously inflated male hind femur.

Holotype ♂: SOUTH AFRICA: *KwaZulu-Natal*: 'RSA: Natal Prov./Pietermaritzburg/ 2.x.1994, 'Town Bush'/ B.J. Sinclair/ ex. cascading stream'; 'HOLOTYPE/ Afroclinocera/ obesa/ Sinclair [red label]' (NMSA).

Recognition: Distinguished from *A. pecki* by the features listed in the above key. Males have a very large, inflated hind femur (Fig. 6) and the apex of the epandrial lobe is narrowed and hooked.

Description: Wing length 4.7–5.0 mm.

Male:

Head: First flagellomere cone-shaped, prolonged apically, bearing long slender arista which is about 2 X length of first flagellomere.

Thorax: Brown; postpronotal lobe, postalar ridge and laterobasal margin of scutellum pale; pleura mostly dark, except anterior margin of anepisternum, posterodorsal corner of katepisternum and laterotergite pale. Dorsocentral bristles with 1–2 setae intermixed.

Wing: Broad, infuscate, with broad anal angle; 1 long costal seta; stigma not apparent; posterobasal margin with 3–4 stout marginal setae.

Legs: Coxae and femora yellowish-brown, remaining segments dark. Clothed in long dark setae. Mid femur with posteroventral row of long setae, nearly twice width of femur, increasing in length apically; 2 anterodorsal and 1 posterior bristles on apical fifth. Mid tibia with rows of posteroventral and anteroventral setae, longer than width of tibia; basal third with 1 long, slender ventral bristle; 1 anterodorsal bristle near middle; 1 long posterodorsal bristle near base; 1 anterodorsal, 1 posterodorsal and 1 anteroventral, pre-apical bristles. Tarsomeres 3 and 4 of mid leg with wedge-shaped, expanded ventral margin. Hind coxa slightly wider than mid coxa. Hind femur inflated, 3–4 X width of mid femur; anteroventral row of stout setae, length one-third width of femur; middle with row of 4–8 stout, posteroventral setae; apical third with pair of anterodorsal bristles. Hind tibia with anterodorsal row of bristles, 3–4 X width of tibia; finger-like projection slightly sinuous. Tarsomeres 3–5 of hind leg laterally compressed, ventral margin forming pruinescent keel.

Terminalia: Hypandrium (Fig. 4) truncate, postgonites present. Phallus erect, straight, arising subapically. Epandrium (Fig. 3) with broad, thumb-like lobe; apex narrowed, hooked, posterior margin sculptured and with fringe of long setae. Cercus short with apex pointed, not subdivided. Surstylus sickle-shaped, apex hooked.

Female: Similar to males, except: hindleg unmodified (see generic description).

Additional material examined: Paratypes: SOUTH AFRICA: *KwaZulu-Natal*: 1♂ 2♀, same data as holotype (NMSA, CNC).

Distribution. This species is known only from the type locality, and was collected in a shaded, cascading stream in an indigenous forest (altitude *ca.* 1000 m) on an escarpment near Pietermaritzburg (Smith 1969).

Afroclinocera pecki sp. n.

Figs 1, 2, 5, 7

Etymology: Named in honour of the collector, Stewart B. Peck, a dedicated collector, evolutionary biologist, and generous teacher.

Holotype ♂: SOUTH AFRICA: *Kwa-Zulu Natal*: 'RSA, Natal 1500m/ 75km WSW Estcourt/ Cathedral Pks.For.Sta./ 14.XII.79, S.& J. Peck'; 'HOLOTYPE/ *Afroclinocera/ pecki/* Sinclair [red label]' (NMSA).

Recognition: Distinguished from *A. obesa* by the features listed in the above key. Males have generally less inflated femora, and the apex of the epandrial lobe is evenly rounded.

Description: Wing length 4.0–5.0 mm.

Male:

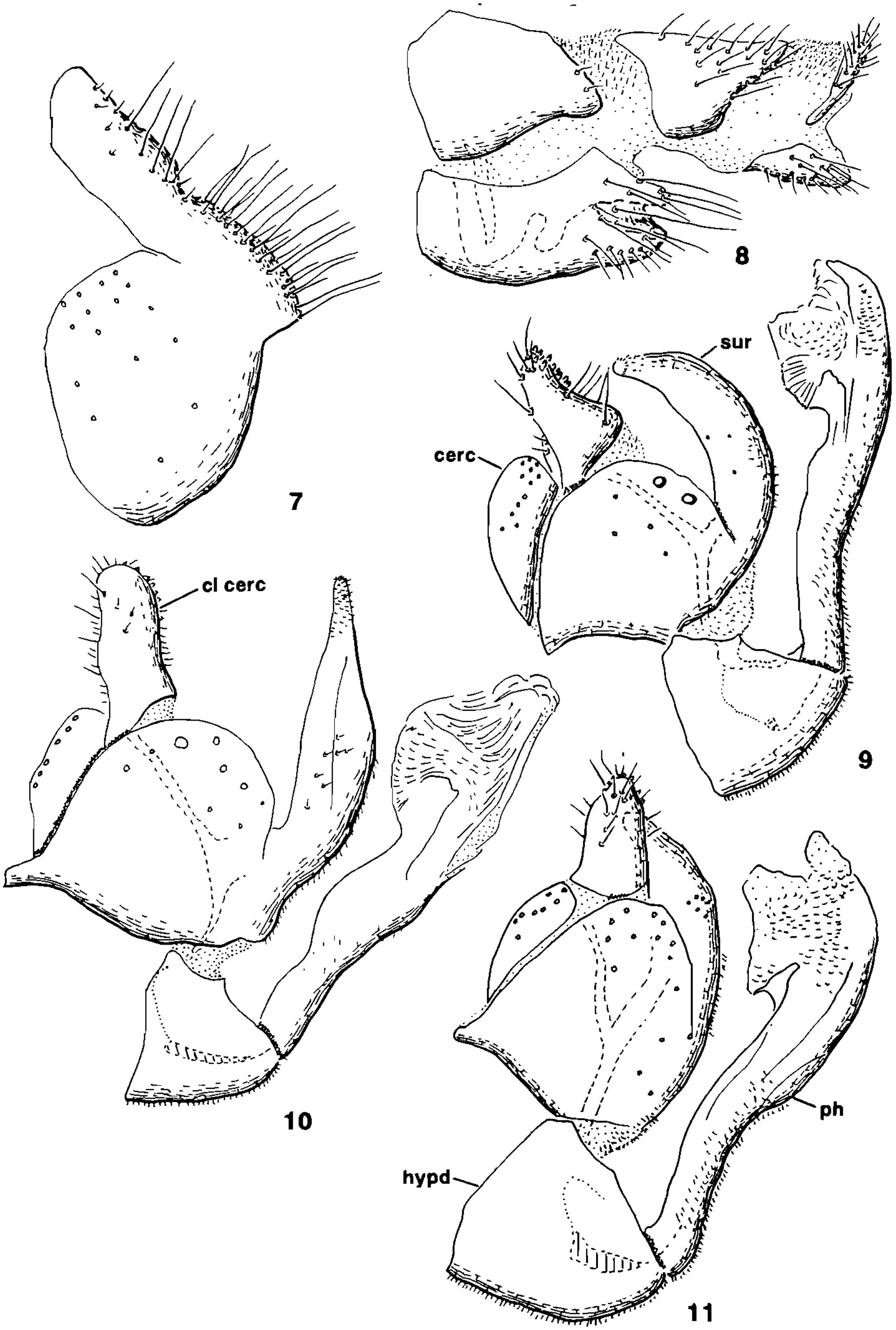
Head: First flagellomere onion-shaped, bearing long slender arista which is more than 3 X length of first flagellomere.

Thorax: Brown; postpronotal lobe, postalar ridge and laterobasal margin of scutellum pale; pleura mostly dark, except anterior margin of anepimeron. Dorsocentral bristles with 2–3 setae intermixed.

Wing: Broad, infuscate, with broad anal angle; 1 long costal seta; stigma not apparent; posterobasal margin with 2–3 stout marginal setae.

Legs: Coxae and femora yellowish-brown, remaining segments dark. Clothed in long dark setae. Mid femur with posteroventral row of long setae, nearly twice width of femur, increasing in length apically; 2 anterodorsal and 1 posterior bristles on apical fifth. Mid tibia with rows of posteroventral and anteroventral setae, longer than width of tibia; basal third with 2 long, slender ventral bristles; 1 anterodorsal bristle near middle; 1 long posterodorsal bristle near base; 1 anterodorsal, 1 posterodorsal and 1 anteroventral, pre-apical bristles. Tarsomeres 3 and 4 of mid leg with wedge-shaped, expanded ventral margin. Hind coxa slightly wider than mid coxa. Hind femur inflated, 2–3 X width of mid femur; anteroventral row of stout setae, length one-third width of femur; middle with row of 4–8 stout, posteroventral setae; apical third with pair of anterodorsal bristles. Hind tibia with anterodorsal row of bristles, 3-4 X width of tibia; finger-like projection nearly straight. Tarsomeres 3 and 4 of hind leg laterally compressed, ventral margin forming pruinescent keel.

Terminalia: Hypandrium (Fig. 5) truncate, apparently lacking postgonites. Phallus erect, straight, arising subapically. Epandrium (Fig. 7) with broad, thumb-like lobe;



Figs 7–11. Male and female terminalia, lateral view. 7. *A. pecki* sp. n., epandrium. 8. *A. obesa* sp. n., female. 9. *Clinocera adesa* sp. n., male. 10. *C. smithi* sp. n., male. 11. *C. tripunctata* Smith, male. [Abbreviations: cerc = cercus; cl cerc = clasping cercus; hypd = hypandrium; ph = phallus; sur = surstylus.]

apex evenly rounded; posterior margin and outer margin of lobe with fringe of long setae. Cercus short with apex pointed, not subdivided. Surstylus sickle-shaped, apex slightly hooked.

Female: Similar to males except: hind leg unmodified (see generic description).

Additional material examined. Paratypes: SOUTH AFRICA: *KwaZulu-Natal*: 3 ♂ 3 ♀, same data as holotype (NMSA, CNC).

Distribution. This species is also known only from the type locality, collected at 1500 m in a malaise trap set in or adjacent to Afromontane forest (see Duxbury & Barraclough 1994).

Clinocera Meigen

The following species represent a previously unrecognised species-group of uncertain relationships and is here coined the *C. tripunctata* group. The significance of these species is further emphasised by the absence of *Clinocera* from elsewhere in Africa. The East African species, *Clinocera aquatica* (Becker) is not congeneric (see Sinclair 1999). All other genera of Clinocerinae, except *Afroclinocera*, have close relatives in East Africa and Europe. This Southern African species-group is characterised by the following: phallus lacking apical filament (distiphallus); stigma beyond R_1; four dorsocentral bristles; wing spots small, white and round. The loss of the apical phallic filament is also known in several nearctic species of *Clinocera*, but these species are assigned to species-groups that include species with normal phallic filaments.

In the southern hemisphere, all southern South American species of *Clinocera* are assigned to the *C. stagnalis* group, whereas the Australian species are assigned to the *C. lineata* group (Sinclair, unpubl. data). The *C. tripunctata* group is unknown in the northern hemisphere and consequently appears to be a unique group with its closest relatives unknown. This group may be the result of long isolation, especially in comparison to other clinocerine genera with conspecifics in the uplands of East Africa.

Key to South African species of *Clinocera*

1 Wing with 2 distinct clear or white circular spots (distal half of cell dm and middle of M_1); third spot very faint (KwaZulu-Natal) .... **tripunctata** Smith

– Wing with 3 distinct clear or white circular spots (distal half of cell dm, middle of M_1, proximal third of cell m_2) 2

2 Legs dark; coxae with pale pruinescence; male hind tibia and first tarsomere with very stout, long setae (longer than width of leg segment); clasping cercus evenly tapered on both sides (Fig. 10) (Cape) .... **smithi** sp. n.

– Inner margin of femora and coxae yellowish-brown; male hind tibia and first tarsomere with slender setae, not longer than width of leg segment; clasping cercus strongly tapered on upper margin (Fig. 9) (KwaZulu-Natal)........................ **adesa** sp. n.

Clinocera adesa sp. n.

Fig. 9

Etymology: From the Anglo-Saxon word for battle-axe; in reference to the shape of the phallus.

Recognition: Distinguished by three clear spots on the wing, and pale coloured coxae and inner margin of the femora.

Holotype ♂: SOUTH AFRICA: *KwaZulu-Natal*: 'SOUTH AFRICA : Natal/ Cathedral Peak Area/ 28–31 May 1981/ R.M. Miller 2829CC/ grassland'; 'Holotype/ *Clinocera*/ *adesa* Sinclair [red label]' (NMSA).

Description:

Male: Wing length 3 mm.

Head: Face with blue pruinescence.

Thorax: Lower half of pleura with blue pruinescence; upper half of pleura, postnotum and scutum brown; scutum with pair of very pale, broad vittae. Several fine acrostichals anterior to first dc; 4 pairs strong dc; 1 ppm; 0 presut spal; 1 npl; 0 psut spal; 1 pal; 1 pair sctl. Laterotergite with dark setae.

Legs: Coxae and inner margin of femora distinctly yellowish-brown, remaining segments dark. Fore femur with pre-apical comb; lacking ventral setae. Hind tibia with short posterodorsal setae on apical third. Hind first tarsomere lacking stout setae; fifth tarsomere lacking dorso-apical extension; empodium and pulvilli nearly as long as fifth tarsomere.

Wing: Infuscate, with 3 clear spots: distal half of cell dm, middle of M_1, proximal third of cell m_2; 1 basal costal bristle; stigma just beyond apex of R_1, faint, elliptical; cell dm truncate. Halter dark.

Abdomen: Tergites pale brown, sternites with pale blue pruinescence. Terminalia (Fig. 9): hypandrium subtriangular, smaller than epandrium. Phallus stout, short, slightly arched; distiphallic filament lacking; apex widely expanded, bearing lateral ridges; apex with broad, U-shaped cleft. Surstylus long and slender, apex prolonged, rounded. Clasping cercus L-shaped, apex rounded; inner face densely clothed with short, blunt setae on upper half.

Female: Unknown.

Additional material examined. Paratype: SOUTH AFRICA: *Natal Province*: 1♂, 75 km WSW Estcourt, Cathedral Peaks For Stn., 1760 m, 21–13.xii.1979, S. & J. Peck (CNC).

Clinocera smithi sp. n.

Fig. 10

Etymology: Named in honour of Kenneth G. V. Smith, whose (1969) monograph represented the most important and ground-breaking work for the understanding of African Empidoidea.

Holotype : SOUTH AFRICA: *Western Cape*: 'Brit.Mus./1924-423.'; 'S. Africa/ Cape Province./ Tulbagh/ gr. Winterhock/ 5000ft. IV.16/Dr. K.H. Barnard'; 'PARATYPE/ *Clinocera*/ *tripunctata*/ K.G.V. Smith, 1968'; 'Holotype/ *Clinocera*/ *smithi* Sinclair [red label]' (BMNH).

The holotype was listed as a female paratype of *C. tripunctata*, but it is a male and clearly not conspecific based on its provenance and distinct differences in the male terminalia compared with males collected near the type locality.

Recognition: Characterised by three distinct white spots and distinguished from *C. adesa* by dark legs and stout setae on the hind tibia and first tarsomere.

Description: Wing length 3 mm.

Male:

Head: Face with bright silvery-blue pruinescence; pair of dark setae near margin of eye arising at mid-length.

Thorax: Lower half of pleura with blue pruinescence; upper half of pleura, postnotum and scutum brown; scutum with pair of pale vittae. Several fine acrostichals anterior to first dc; 4 pairs dc; 1 stout pprn; 0 presut spal; 1 stout and 1 fine npl; 0 psut spal; 1 pal; 1 pair sctl, 1 pair of apical setulae. Laterotergite with dark setae.

Legs: All segments dark. Fore femur with pre-apical comb; lacking ventral setae. Hind tibia with very stout posterodorsal, antero-apical and anteroventral setae on apical half. Hind first tarsomere with pair of ventrobasal setae; basal third with anterior, spur-like seta; fifth tarsomere lacking dorso-apical extension; empodium and pulvilli shorter than fifth tarsomere.

Wing: Infuscate, with 3 clear spots: distal half of cell dm, middle of M_1, proximal third of cell m_2; 1 stout, basal costal bristle; stigma just beyond apex of R_1, faint, elliptical; cell dm truncate. Halter dark.

Abdomen: tergites and sternites dark brown. Terminalia (Fig. 10): hypandrium subtriangular, smaller than epandrium. Phallus stout, short, anterior margin sinuous; distiphallic filament lacking; apex expanded, bearing lateral ridges. Surstylus long and slender, apex slender, prolonged, with rounded, setose apex. Clasping cercus thumb-like, apex rounded; innerdorsal face densely clothed with short, stout, blunt setae.

Female: Of uncertain association.

Additional material examined: SOUTH AFRICA: *Western Cape*: 1♀, Robinson Pass, 35 km N Mossel Bay, mtn. spring, 12.i.1983, R. Miller & P. Stabbins (NMSA). This specimen is tentatively conspecific, but lacks stout hind tibial setae and the basal costal seta is less stout.

Clinocera tripunctata Smith

Fig. 11

Clinocera tripunctata Smith, 1969: 291.

Recognition: Distinguished by two clear spots on the wing and pale coloured coxae and inner margin of femora.

Type material examined: Paratype ♂: SOUTH AFRICA: *KwaZulu-Natal*: Drakensberg, Cathedral Peak Forestry Reserve, 23.iv.1957, Indumeni River, 8500-9200', B. & P. Stuckenberg (NMSA).

Description: Wing length 4 mm.

Male:

Head: Face with faint blue pruinescence, brighter when viewed laterally.

Thorax: Lower half of pleura with blue pruinescence; upper half of pleura, postnotum and scutum brown; scutum with very indistinct median stripe, bordered by pair of pale vittae. Several fine acrostichals anterior to first dc; 4 strong pairs dc; 1 short pprn; 0 presut spal; 1 stout and 1 fine npl; 0 psut spal; 1 pal; 1 pair sctl. Laterotergite with dark setae.

Legs: Coxae (at least tips) and femora (especially inner margins) yellowish-brown, remaining segments dark. Fore femur with pre-apical comb; lacking ventral setae. Hind tibia with short posterodorsal setae on apical third; first tarsomere lacking stout setae; fifth tarsomere lacking dorso-apical extension; empodium and pulvilli nearly as long as fifth tarsomere.

Wing: Infuscate, with 2 clear spots: distal half of cell dm, middle of M_1; 1 costal bristle; stigma just beyond apex of R_1, faint, elliptical; cell dm truncate. Halter dark.

Abdomen: Tergites pale brown, sternites with pale blue pruinescence. Terminalia (Fig. 11): Hypandrium subtriangular, smaller than epandrium. Phallus stout, short, slightly arched; distiphallic filament lacking; apex widely expanded, bearing lateral ridges; apex bifid. Surstylus long and slender, apex prolonged, rounded. Clasping cercus thumb-like, apex rounded; inner face densely clothed with short, blunt setae.

Female: Similar to males except: face mostly dark and lower margin of eye with pale pruinescence.

Remarks: Although Smith (1969) stated that a third clear spot is present in the basal half of cell m_2, this spot is very faint and difficult to distinguish. Three distinct wing spots are found in *C. adesa* and *C. smithi* (which includes the paratype of *C. tripunctata*, erroneously identified as female) from the Western Cape. Consequently, this species is known only from the Drakensberg region.

Additional material examined: SOUTH AFRICA: *KwaZulu-Natal*: 2♂ 2♀, Drakensberg, Giant's Castle Res. 5.x.1994, 1540 m, B. J. Sinclair (CNC, NMSA); 1♀, Royal Natal NP, Tiger Falls, madicolous zone, 6.viii.1988, B. J. Sinclair (CNC).

Dolichocephala Macquart

There are three species of *Dolichocephala* recorded from Southern Africa (Smith 1969). This genus is locally common, readily swept from wet depressions and low vegetation. Species are also effectively collected using yellow pan traps.

Dolichocephala duodecempunctata Smith

Fig. 12

Dolichocephala duodecempunctata Smith, 1969: 287.

Recognition: Distinguished from other Southern Africa species by 12 large, distinct wing spots and the lack of stout apical setae on the hypandrium.

Description: See Smith (1969).

Male: Similar to female. *Terminalia* (Fig. 12): Hypandrium subrectangular, with several fine, apical setae. Phallus strongly curved sub-basally, remaining shaft straight; apex bearing large membranous sac, prolonged ventrolaterally. Epandrium oval; subepandrial sclerite prolonged apically well beyond base of clasping cercus. Clasping cercus finger-like, arched medially with broad base; inner apical face with several stout setae. Surstylus short, projecting medially with pointed apex.

Remarks: This species was described based on three females collected in the Drakensberg mountains. Included here is the first record of a male of this species. The reduced number of dorsocentral bristles (3) observed by Smith (1969) in the female holotype is also present in both sexes examined in this study. This species lacks the stout, apical hypandrial setae and long, slender distiphallus present in the other two Southern African species. It is probably more closely related to an East African species as suggested by Smith (1969).

Additional material examined: SOUTH AFRICA: *KwaZulu-Natal*: 3♂1♀, Drakensberg nr Cathedral Peak, Indumeni R. For., 1.x.1991, H. Ulrich (ZFMK); 1♂ 3♀, 75 km WSW Estcourt, 1400 m, Cathedral Peak For. Stn., 17–31.xii.1979, S. & J. Peck (CNC); 3♂ 3♀, Town Bush, Pietermaritzburg, 2.x.1994, B. J. Sinclair (CNC, NMSA).

Dolichocephala fuscilanx Garrett Jones

Dolichocephala fuscilanx Garrett Jones, 1940: 290.

Recognition: This species is distinguished by its more than 20 wing spots and comb of eight, stout, apical hypandrial setae.

Description: See Garrett Jones (1940).

Distribution: This species is known from East Africa (Ruwenzori – Uganda and Aberdare Range – Kenya) and South Africa (See 'Remarks' under *Kowarzia*, below).

Remarks: Two morphological forms of this species were recently collected on the same date in Town Bush, Pietermaritzburg. The first series is identical to the original description of this species, but a second series differs in possessing pale halteres. However, the male terminalia of the second series is identical to *D. fuscilanx*, and the morph is thus considered conspecific.

Additional material examined: SOUTH AFRICA: *Western Cape*: 9♂18♀, Knysna, Diepwalle For., 21.x.1991, 5.xi.1991, H. Ulrich (ZFMK). *KwaZulu-Natal*: 1♂, Drakensberg nr Cathedral Peak, Indumeni R. For., 1.x.1991, H. Ulrich (ZFMK); 8♂ 3♀, Town Bush, Pietermaritzburg, 2.x.1994, B. J. Sinclair (CNC).

Kowarzia Mik

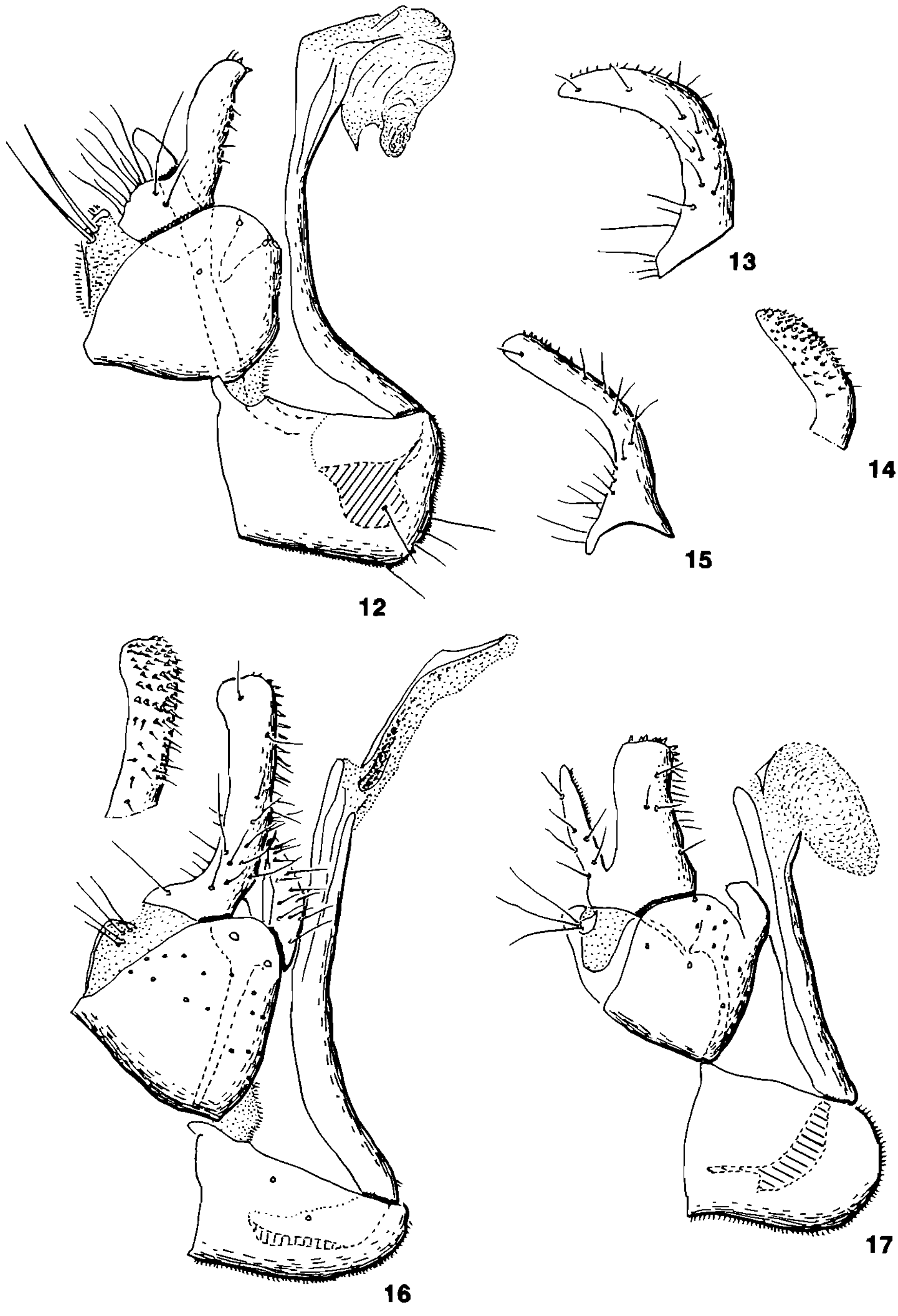
This genus is readily distinguished from most clinocerines by setulae aligned along the inner margin of the eye. *Kowarzia* is currently known only from the western Palearctic and the Afrotropical Regions (Sinclair 1995).

Kowarzia capicola (Smith)

Figs 13–16

Wiedemannia capicola Smith, 1967: 231.
Clinocera (Hydrodromia) capicola: Smith, 1969: 291.
Kowarzia capicola: Sinclair, 1995: 703.

Recognition. Only a single species of this genus is recorded from Southern Africa. It appears very similar to *Clinocera*, but is distinguished from it by the presence of facial setulae.



Figs 12–17. Male terminalia, lateral view. 12. *Dolichocephala duodecempunctata* Smith. 13–16. *Kowarzia capicola* (Smith). 13–15. Clasping cercus (14. Inner view). 16. Terminalia, with inner view of clasping cercus. 17. *Roederiodes bifidus* sp. n.

Description: See Smith (1967).

Remarks: Several morphological forms of *K. capicola* appear to be common in South Africa. Form A is similar to that illustrated for *K. capicola* (Smith 1967, fig. 13; Fig. 13 in this paper), possessing a strongly curved clasping cercus. In some specimens, the apex is blunt as in the type series, or the apex may be slightly tapered, as in specimens from the Drakensberg (Fig. 13). In Form B, the clasping cercus is nearly straight, with a square apex (Fig. 16). An intermediate type, Form C, possesses a distinctly curved clasping cercus (Fig. 15), but it is not as strongly curved as in Form A. All three forms occur sympatrically at the Pietermaritzburg site listed below. In addition, the phallus appears identical in all forms, while leg colouration varies among all forms, with coxae and femora dull to bright brownish-yellow. The scutum in all forms has a dark median vitta, bordered by dull, greyish vittae. No clear separation was detected between forms and consequently the variation in the curvature of the clasping cercus is considered to be intraspecific variation within *K. capicola*. Variation in the shape of the clasping cercus has been documented also in *Wiedemannia* (Niesiolowski 1988; Sinclair 1998).

On the basis of colouration, *K. capicola* is very similar to *K. chaniae* (Garrett Jones, 1940), from Kenya, but associated males of the latter species are required. Alternatively, if this variation is accepted, *K. usambarica* (Wagner & Andersen, 1995), is probably conspecific (material was based on alcohol specimens, where colours can be modified and thoracic vittae are not visible). The curvature of the clasping cercus of the latter species falls within the variation observed in *K. capicola*.

Although *K. usambarica* is known from Tanzania, this wide distribution is also found in other clinocerines, for example, *D. fuscilanx* Garret Jones, 1940 (East and South Africa) and other Diptera (e.g. *Chrysopilus testaceus* Loew). This geographic pattern suggests that these species may have only relatively recently dispersed southwards through Africa, possibly during the Late Pleistocene, on a former belt of humid montane forest which has become extensively fragmented (Stuckenberg 1997; DeBusk 1998).

TABLE 2

Species of the *Kowarzia plectrum* group and their geographic distribution.

Species	Distribution
amarantha (Becker, 1908)	Canary Islands
capicola (Smith)	South Africa
cataractae (Pusch, 1996)	Corsica
chaniae (Garrett Jones)	Kenya
jalonae (Wagner, 1984)	Sierra de Guadarrama (Spain)
plectrum (Mik, 1880)	widespread in continental Europe, east to Transcaucasus (Chvála & Wagner 1989; Wagner & Andersen 1995)
rivalis (Wagner, 1995)	Italy
sandaliae (Wagner, 1984)	Sardinia (Italy)
subplectrum (Vaillant & Vinçon, 1987)	French Pyrennes
usambarica (Wagner & Andersen)	Tanzania

Kowarzia capicola is part of a species-complex within the *K. plectrum* group (Table 2). A large number of species have been described with slight variation in curvature of the clasping cercus and body colouration. Many species are based on small series, exhibiting slight differences within a limited geographic region. These restricted species definitions usually result in a number of residue specimens that cannot be assigned to the new species and remain assigned to the most widespread species. The series of species listed in Table 2 require revision, utilising a vast number of specimens over wide geographic regions, including areas between type localities of the various species. I predict there will be, if not already, many specimens which share a number of distinguishing characters. Thus the species concepts will undoubtedly overlap, possibly resulting in a single, widespread, highly variable species.

Geographic distance and gaps should not be used as criteria for species recognition alone. Widespread species do exist, including common species between East and Southern Africa (see above). There are also several examples among Holarctic species in the Clinocerinae (Sinclair 1994 1998). Before additional regional species are split off from this complex, a global examination is strongly recommended.

Additional material examined: SOUTH AFRICA: *KwaZulu-Natal*: 1♂, Drakensberg nr Cathedral Peak, Doreen Falls, 2.x.1991, H. Ulrich (ZFMK); 1♂, Drakensberg nr Cathedral Peak, Fern For., Ogalweni R. valley, 30.ix.1991, H. Ulrich (ZFMK); 2♂, Drakensberg nr Cathedral Peak, Indumeni R. For., 1.x.1991, H. Ulrich (ZFMK); 8♂ 3♀, Drakensberg, Giant's Castle Res., 5.x.1994, 1540 m, cascading streams, B. J. Sinclair (CNC, NMSA); 7♂ 5♀, Karkloof Range, Geekie's Farm, 4.x.1994, B. J. Sinclair (CNC); 2♂ 2♀, Krantzkloof Nat. Res., 20 km W Durban, 6.x.1994, B. J. Sinclair (NMSA); 13♂ 27♀, Pietermaritzburg, Town Bush, 2.x.1994, cascading stream, B. J. Sinclair (CNC, NMSA); 3♂ 2♀, Shongweni/ Assagay, 30 km W Durban, waterfall, 6.x.1994, B. J. Sinclair (CNC).

Roederiodes Coquillett

The following new species was first reported in Sinclair (1995) and represents the first description of this widespread genus from Southern Africa, a genus known from most continents except Australia and South America. A new species, *R. tanzaniae* Wagner & Andersen, was recently described from East Africa (Wagner & Andersen 1995) and the distinctive bilobed clasping cercus, also present in the species described below, suggests a close relationship.

Roederiodes bifidus sp. n.

Fig. 17

Etymology: In reference to the bilobed clasping cercus.

Holotype ♂: SOUTH AFRICA: *KwaZulu-Natal*: 'RSA: Natal Prov./ Karkloof Range, Geekie['s]/ Farm 4.x.1994/ B.J. Sinclair/ ex. rocky stream'; 'HOLOTYPE/ *Roederiodes*/ *bifidus*/ Sinclair [red label]'(NMSA).

Recognition: Distinguished from *R. tanzaniae* Wagner & Andersen by its more truncate clasping cercus, which lacks the lateromedian lobe.

Description: Wing length 3.0–3.2 mm.

Male:

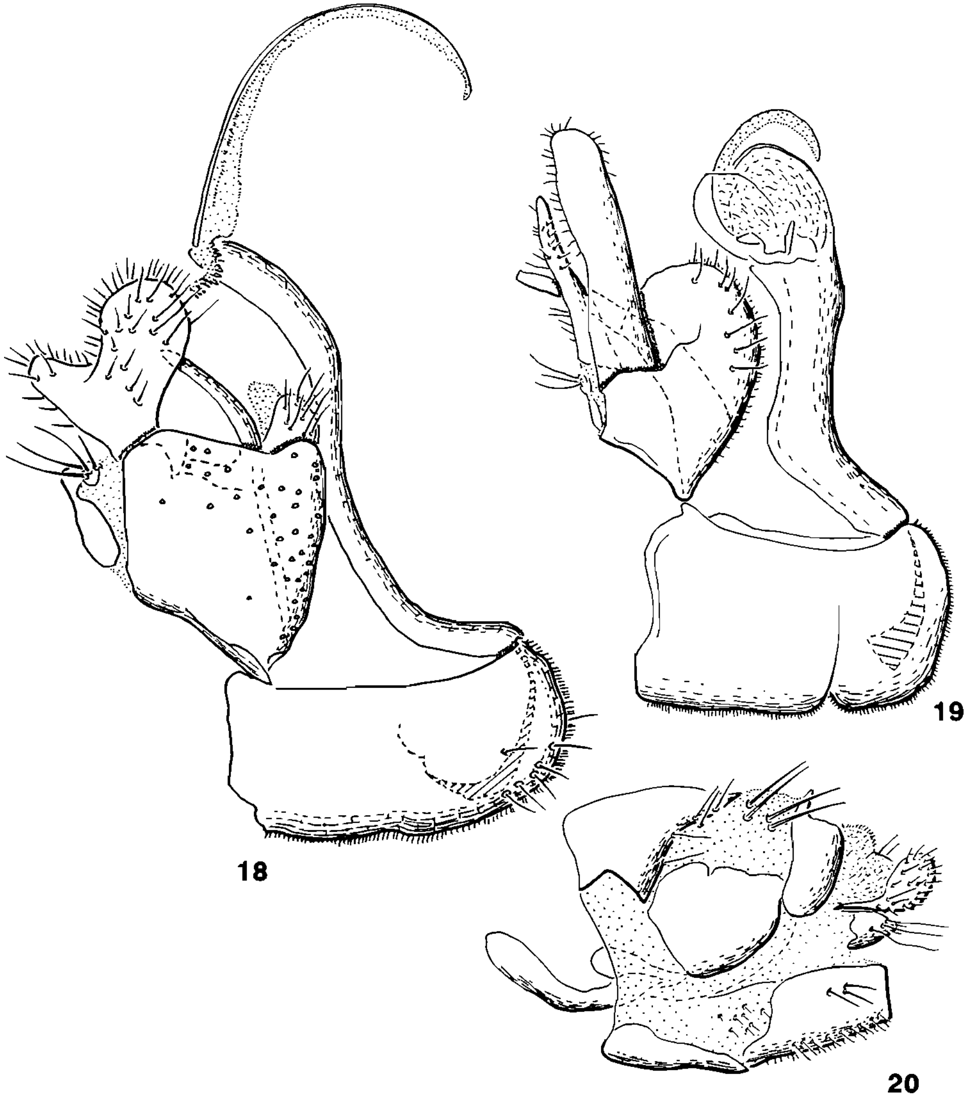
Head: Dark brown, upper face and ocular margin with silver pruinescence; proboscis three-quarters as long as height of head.

Thorax: Orange; scutum with pale pair of median vittae. Several inconspicuous acrostichals anterior to first dc, 5 pairs dc; 1 pprn; 2 npl; 1 presut spal; 0 psut spal; 1 pal; 1 pair sctl and 2 pairs of marginal setulae and numerous setulae on disc.

Wing: infuscate; 1 long, basal costal seta; cell dm pointed with M veins coalesced for short distance before M_1 and M_2 branch. Halter dark brown.

Legs: Coxae and femora orange-brown, remaining leg segments dark brown. Fore and mid femora with anteroventral and posteroventral rows of long setulae.

Abdomen: Dark brown. Terminalia (Fig. 17): Hypandrium larger than epandrium;



Figs 18–20. Terminalia of *Wiedemannia*, lateral view. 18. *W. edendalensis* Smith, male. 19. *W. hughesi* Smith, male. 20. *W. hughesi*, female.

surstylus short, truncate. Clasping cercus bilobed; anterior lobe slender with narrow apex; posterior lobe subrectangular, apex truncate with stout setae along dorsal margin. Phallus straight, apex expanded into membranous V-shaped sac.

Female: Similar to male except: ventral setulae of fore and mid femora not as pronounced.

Additional material examined: Paratypes: SOUTH AFRICA: *KwaZulu-Natal*: 2♂ 4♀, same data as holotype (CNC, NMSA); 2♀, 75 km WSW Estcourt, Cathedral Peak For. Stn., 1760 m, 7–13.xii.1979, S. & J. Peck (CNC); 1♀, Drakensberg, Giant's Castle Res., 5.x.1994, 1540 m, cascading stream, B. J. Sinclair (NMSA); 1♀, Pateni Estates, Richmond Dist., 2930CC, 28.ii.1968, B. & P. Stuckenberg (NMSA); 1♀, Pietermaritzburg, Town Bush, 2.x.1994, cascading stream, B. J. Sinclair (CNC).

Wiedemannia Zetterstedt

In the Afrotropical Region there are four East African species (see Sinclair 1999) and four Southern African species (Smith 1969). These African species form a monophyletic group based on the following synapomorphies of the male terminalia: unique attachment of the apical phallic filament; subepandrial sclerite prolonged beyond base of the clasping cercus. The prolongation of the subepandrial sclerite is known only in some species of *Dolichocephala* (Fig. 12). The African species are not currently assigned to a subgenus, but appear to be closely related to the European subgenera, *Eucelidia* Mik and *Roederella* Engel on the basis of long, erect seta(e) on the fore coxa and reduced acrostichal setae (see Sinclair 1995). The relationships and biogeographic patterns of the Afrotropical species of *Wiedemannia* are discussed in Sinclair (1999).

Key to males of Southern African species of *Wiedemannia*

(Females are generally very difficult to identify without associated males)

1 More than 8 stout postocular setae along eye margin, extending to lower half of eye; clasping cercus bifid, divided into 2 separate lobes; apical phallic filament short, less than one-quarter length of phallic shaft; apex of phallus broad (Fig. 19) .... **hughesi** Smith

– Margin of eye with 4–6 stout postocular setae; clasping cercus partially to deeply cleft, but not completely separated; apical phallic filament long, at least one-third length of phallic shaft; apex of phallus narrow 2

2 Pleura lacking dark transverse band; postpronotal bristle long, slender, similar to dorsocentral bristles; clasping cercus U-shaped (Fig. 21) .... **rudbecki** Smith

– Pleura with transverse dark band; postpronotal bristle shorter and stouter than dorsocentral bristles; clasping cercus mitten-shaped 3

3 Apex of phallic shaft somewhat expanded; broad posterior lobe of clasping cercus evenly rounded (Fig. 18) .... **edendalensis** Smith

– Apex of phallic shaft slender, not expanded apically; broad posterior lobe of clasping cercus angulate .... **gorongoza** Smith

Wiedemannia edendalensis Smith

Fig. 18

Wiedemannia edendalensis Smith, 1969: 295.

Recognition: Accurately distinguished from *W. gorongoza* only by the shape of the clasping cercus and possibly also by the slight enlargement of the apical third of the phallic shaft.

Description: See Smith (1969).

Remarks: *Wiedemannia edendalensis* and *W. gorongoza* are externally very similar and difficult to distinguish. The stigma character used in Smith's (1969) key to species is variable and often very faint. In addition, the clasping cerci are very similar in shape suggesting that these species are possibly conspecific. Unfortunately the terminalia of the holotypes have been destroyed, so re-evaluation of these species is dependent on collection of material from their type localities and comparison among a wide range of populations and specimens.

The depth of the cleft in the clasping cercus of *W. edendalensis* appears variable and suggests a wider variation may also include *W. gorongoza*. The phallic shaft of *W. gorongoza* appears reduced apically in Smith's figure (Fig. 378), in comparison to the slightly swollen shaft (Fig. 18) of *W. edendalensis*. However, this may be a distortion resulting from clearing the genitalia in strong acid.

Additional material examined: SOUTH AFRICA: *KwaZulu-Natal*: 1♂ 1♀, Drakensberg, Giant's Castle Res., 5.x.1994, 1540 m, cascading streams, B. J. Sinclair (CNC); 3♂, Pietermaritzburg, Town Bush, 2.x.1994, cascading stream, B. J. Sinclair (CNC). *Western Cape*: 2♀, Mitchell's Pass, Ceres Dist., 6.x.1959, B. & P. Stuckenberg (NMSA).

Wiedemannia hughesi Smith

Figs 19, 20

Wiedemannia hughesi Smith, 1969: 294.

Type material examined: Paratypes 11: SOUTH AFRICA: *Mpumalanga*: 'Barberton/ area/ E. Transvaal/ D.A. Hughes [handwritten]'; 'PARATYPE/ *Wiedemannia/ hughesi/* K.G.V. Smith, 1968' (NMSA).

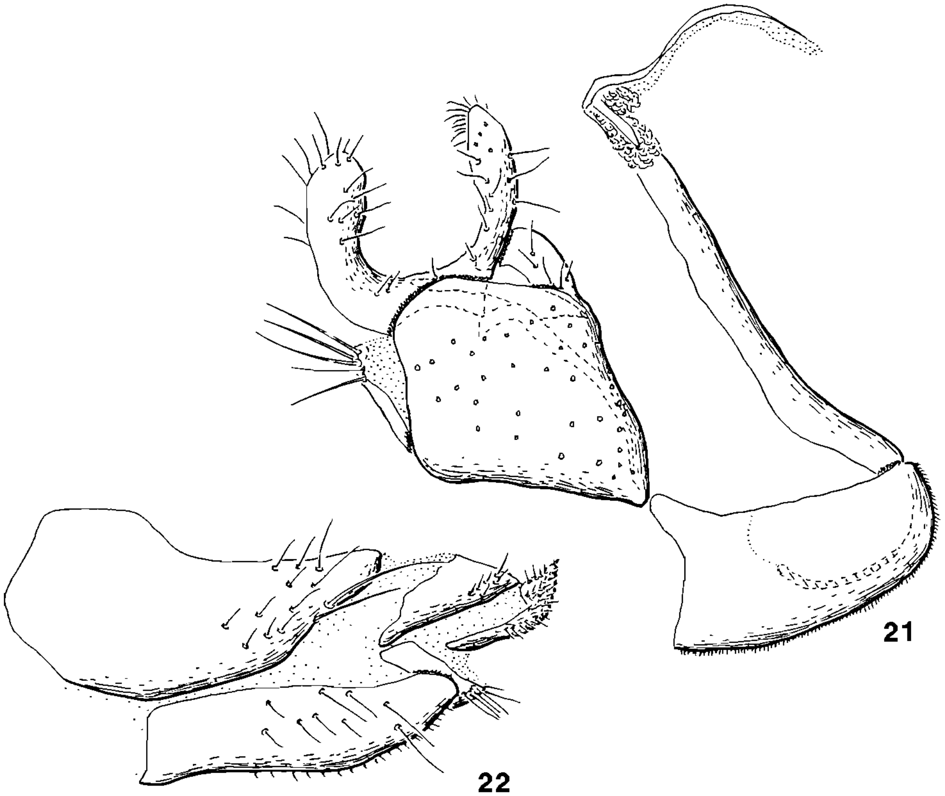
Recognition: Distinguished from all other African species by the bifid clasping cercus and broad phallus with short apical filament.

Description:

Male:

Head: Upper half of face above carina with spot of shiny blue pruinescence; lower half with median carina dark with pair of lateral, bright blue pruinescent, oval patches; vertex brown; postoccipital setae stout, extending to lower half of eye.

Thorax: Pleura, postpronotal lobe and laterotergite with blue pruinescence; scutum brown. Several acrostichals anterior to first dc; 6–7 pairs dc, with numerous short setulae interspersed; 2 stout pprn; 1–2 psut spal; 2 npl; 1 psut spal; 1 pal; 1 pair sctl, with numerous short setulae on disc and margin. Laterotergite with patch of pale setae; antepronotum with pair of lateral, spine-like setae.



Figs 21–22. Terminalia of *Wiedemannia rudbecki* Smith, lateral view. 21. Male. 22. Female.

Wing: Broad, faintly infuscate; stigma apparently absent; 1 basal costal bristle; R_4 and R_5 straight and diverging; apex of cell dm prolonged.

Legs: Coxae with blue pruinescence, concolorous with pleura; remaining leg segments dark brown. Fore coxa lacking strong, erect seta near middle. Fore femur with anteroventral row of short, fine setae; posteroventral row of long, fine setae. Fifth tarsomere with long, dorso-apical extension; empodium pulvilliform yellowish-white, laterally flattened, extending beyond extension of tarsomere.

Terminalia (Fig. 19): Hypandrium stout, subrectangular, longer than epandrium; apical third partially constricted. Phallus strongly arched at base, sinuous, apex greatly expanded and round; distiphallus very short, not extended beyond apex of phallus; ejaculatory apodeme long, narrow, recurved. Epandrium not swollen laterally, little wider than hypandrium; apex strongly rounded, with long setae along dorsal margin. Subepandrial sclerite with long, pointed, triangular, apical prolongation, extending well beyond base of clasping cercus. Surstylus short, rounded. Clasping cercus divided completely into pair of long, slender lobes; anterior lobe half width of posterior lobe; cercal plate with setae confined to small apical lobe.

Female: Similar to male. Terminalia (Fig. 20): T8 weakly sclerotised laterally, bearing 5–6 long setae; S8 extending well beyond tergite, truncate, with weakly sclerotised central region. T10 truncate, rectangular. Cercus short, rounded, clothed in fine setae. Genital furca very pronounced, with median Y-shaped sclerite, articulated laterally with broad plate; spermatheca tubular, short, straight, extending into segment 7.

Remarks: This species is redescribed and illustrated to aid in detailed comparative and phylogenetic studies. The terminalia of both males and females are unique in the genus and are only clearly assigned to the African species-group by the long subepandrial process.

Wiedemannia rudbecki Smith

Figs 21, 22

Wiedemannia rudbecki Smith, 1967: 230.

Recognition: Distinguished from similar species by the long, slender postpronotal setae and U-shaped clasping cercus (Fig. 21).

Description: See Smith (1967).

Female: Similar to male. Terminalia (Fig. 22): T8 with V-shaped, membranous notch on posterior margin; bearing more than 10 long setae laterally; S8 extending somewhat beyond tergite, tapered, with slight apical notch. T10 rectangular, divided medially by wide membranous band. Cercus short, apex strongly tapered, clothed in fine setae. Genital furca not strongly developed; spermatheca tubular, short, straight, and trachea-like, extending into segment 7.

Remarks: Appears to be the most frequently encountered species of *Wiedemannia* in Southern Africa, and is known from Lesotho, the Western Cape and KwaZulu-Natal provinces of South Africa.

Additional material examined: SOUTH AFRICA: *KwaZulu-Natal*: 3♂ 4♀, Drakensberg, Giant's Castle Res., 5.x.1994, 1540 m, cascading streams, B. J. Sinclair (CNC, NMSA); 2♂ 2♀, Karkloof Range, Geekie's Farm, 4.x.1994, B. J. Sinclair (CNC); 74, Karkloof Range, 4.x.1994, Mholweni R., B. J. Sinclair (CNC, NMSA); 1♂, Pietermaritzburg, Town Bush, 2.x.1994, cascading stream, B. J. Sinclair (CNC); 1♂ 1♀, Shongweni/ Assagay, 30 km W Durban, waterfall, 6.x.1994, B. J. Sinclair (CNC).

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